DEVELOPING ADVANCED MANUFACTURING IN AUSTRALIA

Response to the Inquiry by The House of Representatives Standing Committee on Industry, Science and Resources

March 2023



TABLE OF CONTENTS

ntroduction	3
Terms of Reference	4
The opportunities of advanced manufacturing for Australia – including in relation to job creation, productivity and capability4	1
International trends in advanced manufacturing4	ł
Competitive strengths and advantages of Australia in advanced manufacturing, includin Australia's comparative international position in advanced manufacturing	ıg 5
Clinical Trials	5
World class health and medical research and innovation	5
Advanced Manufacturing Capability	5
Barriers to the growth of advanced manufacturing in Australia – including barriers to existing manufacturers, particularly small and medium enterprises, adopting advanced manufacturing technologies and processes such as AI and robotics	7
Financial and non-financial investment opportunities or possible reforms to support the growth of advanced manufacturing in Australia in: renewables and low emission technology; medical science; transport; value adding in agriculture, forestry and fisheri value adding in resources; defence; and enabling capabilities	es;
Using Government procurement to promote innovation	9
The opportunities to increase the number of workers employed in advanced manufacturing, including consideration of ways to increase the participation and retention of women and other historically underrepresented groups;	ion 2
Workforce and Training	12
Skills needs in advanced manufacturing14	ł
Conclusion	.15

Introduction

Research Australia welcomes the opportunity to make this submission to the response to the Inquiry by The House of Representatives Standing Committee on Industry, Science and Resources into Developing Advanced Manufacturing in Australia.

As the national peak body for Australian health and medical research and innovation, representing the entire pipeline from research to manufacturing, Research Australia welcomes the Government's identification of Medical Products as a priority area.

We have addressed the opportunities for advanced manufacturing in medical products, including medicines, vaccines, diagnostics, medical devices and medical equipment. Examples of Australian companies in some of these areas at different stages of maturity are EmVision (imaging), Vaxxas (vaccine delivery technology) and CSL (vaccines and blood products).¹

Our submission responds to the Terms of Reference.

Research Australia represents the entire Health and Medical Research and Innovation pipeline



¹ EmVision has been supported by the MRFF Frontiers Program <u>https://emvision.com.au/</u> Vaxxas has received Australian Government support and is establishing a new manufacturing facility in Queensland. <u>https://www.vaxxas.com/</u>

Terms of Reference

The opportunities of advanced manufacturing for Australia – including in relation to job creation, productivity and capability

Medical products is an area where Australia has historically had world leading research and in which significant advances in developing a more mature domestic industry have been made recently. In the last two years:

- Australia's CSL has continued to invest in Australia with the recent opening of a new plasma fractionation plant, construction of a new vaccine manufacturing plant, and a start up incubator due to open in its new Melbourne headquarters in 2023.²
- The Australian and Victorian Governments have partnered to bring Moderna to Australia's shores to manufacture mRNA vaccines and therapeutics.³
- The Queensland Government has announced an mRNA partnership with Sanofi.⁴
- BioNTech have chosen Victoria to establish their Asia-Pacific mRNA clinical research and development centre.⁵
- NSW is establishing a first-of-its-kind pilot facility to develop mRNA and RNA drugs and vaccines in partnership with all NSW universities.⁶

There is also evidence of increased commercial activity; ASX-listed biotech companies now represent a market capitalisation of approximately \$233 billion as at March 2020 compared to around \$170 billion in 2019, demonstrating a substantive 27 per cent increase in value.⁷

This provides a strong base to build on, and both the recently legislated Australia's Economic Accelerator and the National Reconstruction Fund (currently before the Senate) provide an opportunity to build on this existing economic base.

International trends in advanced manufacturing

One of the key trends in advanced manufacturing has been driven by the collapse of global supply chains in the last few years, driven largely by the effects of the COVID pandemic. COVID related illness and lockdowns led to workforce related reductions in production for a range of goods, including components for advanced manufacturing. This has perhaps been most notable to the public in long delays on the manufacture of new cars but has also hit the supply chain for industry-inputs for manufacturing, including manufacturing equipment and machinery has also been affected by long delays.

²https://www.google.com/search?q=CSL+manufacturing+in+austrlia&rlz=1C5CHFA_enAU930AU930&oq=CSL+manufacturing+in+austrlia&aqs=chrome..69i57.5914j0j15&sourceid=chrome&ie=UTF-8

³ https://www.austrade.gov.au/international/invest/investor-updates/moderna-to-build-mrna-vaccine-

manufacturing-facility-in-australia

⁴ https://statements.qld.gov.au/statements/96732

⁵ https://www.premier.vic.gov.au/biontech-coup-more-mrna-manufacturing-research-melbourne

⁶ https://www.nsw.gov.au/media-releases/new-96-million-rna-pilot-manufacturing-facility-for-nsw

⁷ Ausbiotech, 2022, Australia's Life Sciences Sector Snapshot 2022, page 16

At the same time, the COVID pandemic has changed patterns of demand for a range of goods, particularly health related items. This has led to less reliance on 'just in time' manufacturing strategies and a greater emphasis on self-reliance at bother corporate and national levels, as companies and nations seek to secure vital supplies.

Competitive strengths and advantages of Australia in advanced manufacturing, including Australia's comparative international position in advanced manufacturing

Research Australia has called consistently for Australia to set a goal of becoming a net exporter of medical products. This is an achievable goal, and one for which many of the necessary components are falling into place. In addition to new developments in the last two years, listed in the above section, there is a range of other factors in Australia's favour.

Clinical Trials

Australia's strong health system, our diverse population and research expertise have made Australia a destination of choice for clinical trials. Most Australian sites remained open to clinical trials throughout the COVID-19 pandemic, further enhancing our existing reputation.⁸ The Australian Government's One Stop Shop initiative, currently in development, is intended to make the process of undertaking a clinical trial in Australia simpler, faster and more efficient.

Clinical trials are a critical component of the development of any medical product. Australia's clinical trials capability will be an essential element in Australia developing and commercialising more medical products.

World class health and medical research and innovation

Australia spends more than \$8 billion per annum on health and medical research and innovation, representing nearly a quarter of total R&D expenditure in Australia each year. More than 60% of this expenditure occurs in Australia's universities and medical research institutes, which have world leading expertise.⁹

Advanced Manufacturing Capability

At the other end of the pipeline, we also have capability in advanced manufacturing for medical products. In 2019, global exports of pharmaceutical products accounted for USD582 billion. Twenty of the world's nations accounted for 92% of this total, valued at USD534 billion. The world's Number 1 exporter of pharmaceutical products was Germany at USD89.4 billion, with 15.3% of global pharmaceutical exports.

Number 23 was Australia, with exports of USD3.2 billion, or 0.55% of global exports.¹⁰

⁸ https://www.australianclinicaltrials.gov.au/why-conduct-clinical-trial-australia

⁹ https://researchaustralia.org/category/hmr-facts/ Analysis by Research Australia using Australian Bureau of Statistics data

¹⁰Sourced 7 July 2022 from

https://atlas.cid.harvard.edu/explore?country=undefined&product=129&year=2019&productClass=HS&targe t=Product&partner=undefined&startYear=undefined

In the same year (2019), Australia imported pharmaceutical products valued at \$USD7.38 billion, or 1.27% of global pharmaceutical imports.¹¹

Pharmaceutical manufacturing, including vaccines and serums, is a sensible area for Australia to seek to expand its advanced manufacturing capability. It is an area where security of supply is paramount; it is also an area where we have existing expertise in manufacturing and world leading expertise in life sciences that we can leverage. It is a growing market, and one where capability is relatively well dispersed around the developed world.

Pharmaceutical products are the case study used here, but similar opportunities exist with other types of medical products, including diagnostics and medical devices. Australia needs to set some clear and ambitious goals if we are to position ourselves for economic success. One such goal would be to become a net exporter of pharmaceuticals by 2035.

Achieving such a target will involve a focus on the Australian manufacture of new, high value medical products in Australia. It would significantly boost our terms of trade in a key world market and create high value jobs. It would also create an ecosystem which would further support new research and commercialisation of new products.

Research Australia submits that Australia becoming a next exporter of medical products by 2035 should be one of the goals of a National Medical Products Industry Plan.

The COVID-19 pandemic revealed how exposed Australia's supply chain is for essential medical products, with significant shortages of some medicines during the COVID-19 pandemic. In addition to medicines these shortages extended to other supplies required by our hospitals and health services. While PPE was a well-publicised identified shortage, there were many other areas where supplies were in short supply, such as reagents required for COVID testing.¹²

The Australian Government is currently consulting on the development of an Australian Centre for Disease Control. It is anticipated one of its first priorities will be to take responsibility for Australia's National Medical Stockpile. While warehousing products in a National Medical Stockpile is one solution to supply chain risks, expanded domestic manufacturing is another approach which can further secure Australia's supplies, particularly in the face of an extended medical emergency, or when novel products are required.

With its extensive data gathering and analysis capabilities and its responsibility for assessing and mediating the risks of future health emergencies, the ACDC would be ideally placed to provide input to a National Medical Products Industry Plan to prioritise manufacturing for medical products where domestic manufacturing capability is considered essential to ensure supply.

One of the objectives of the \$15 billion National Reconstruction Fund is to address supply chain vulnerabilities. In the case of the \$1.5 billion allocated for medical products, the aim is to 'Leverage Australia's world-leading research to provide essential supplies such as medical

¹² See for example, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7833915/ and

¹¹Sourced 7 July 2022 from

https://atlas.cid.harvard.edu/explore?country=undefined&product=129&year=2019&tradeDirection=import&productClass=HS&target=Product&partner=undefined&startYear=undefined

https://www.theguardian.com/australia-news/2022/jan/14/pressure-grows-on-australias-pcr-testing-amid-supply-chain-issues-and-omicron-case-surge

devices, personal protective equipment, medicines and vaccines.¹³ The scope for the NRF and the ACDC to work together to support the supply chain for critical medicines in Australia is one example of why a whole of government approach to the ACDC is critical, and the role a National Medical Products Industry Plan can play.

A National Medical Products Industry Plan would complement and coordinate the work of the ACDC in identifying essential medical products and the role of the NRF in supporting the manufacture of essential supplies.

A further reason is the potential economic benefit from taking a strategic approach to the medical products industry.

Australia already has world class research to support the development of new medical products. We also have expertise in the manufacturing and supply chain for pharmaceuticals. The same is true of many other categories within medical products.

A National Medical Products Industry Plan would bring a new and clear focus to the disparate policy initiatives, funding programs and actions being taken by Commonwealth, State and Territory Governments. It would consider how we can better address the unique challenges to commercialising high value medical products. It would look to the strengths and opportunities of our existing manufacturing capability, and how these can be supported and expanded. It would take a workforce lens to the entire pipeline from research through to manufacturing, to ensure we have the skills and capabilities necessary to deliver the vision. It would help ensure Australia's national security by prioritising manufacturing and skills development in areas essential to our national security.

Many of the components are already here. A National Medical Products Industry Plan would help better coordinate these existing components and identify gaps and emerging opportunities. It would provide a clear focus and goals for Australia's research and innovations sectors and help provide a clear pathway to developing a significant, vibrant and innovative advanced medical products manufacturing industry in Australia.

Barriers to the growth of advanced manufacturing in Australia – including barriers to existing manufacturers, particularly small and medium enterprises, adopting advanced manufacturing technologies and processes such as AI and robotics

Relative to other products, the process from initial research discovery to a new drug, therapy or technology is a long one, commencing upstream with research that leads to new knowledge and flowing downstream through various stages of testing, refinement and regulatory approval to the realisation of a new product which can be manufactured and sold to a customer. The development of medical products, including pharmaceuticals, therapeutics, diagnostics and medical devices is a long and expensive process, typically taking more than a decade.

¹³ Australian Government Department of Industry Science and Resources, 2022, National Reconstruction Fund Consultation Paper, page 2

The transition from product development to the manufacture of medical products provides both a particular challenge and an opportunity for Australia. Clinical trials are an essential part of the process of bringing a medical product to market. The conduct of clinical trials requires having thousands (or tens of thousands) of the product being tested available for use with patients. The manufacture of the product for clinical trials requires facilities that are flexible enough to produce batches of products to the required standard for use in clinical trials but at a scale that is beyond research facilities. Achieving regulatory approval for a product requires having an existing manufacturing capability that meets the necessary standards- this requires an investment up front as part of securing regulatory approval, before you can move to manufacture and commercialise the product.

Having more of this clinical (small) scale manufacturing capacity in Australia would:

- help support Australia as a destination for clinical trials,
- build Australian expertise in manufacturing for the latest types of devices, diagnostics, medicines and drugs; and
- support Australian research which is reliant on access to clinical trial materials to be able to continue research into promising new therapies.
- Provide jobs and expertise to support these activities Plant management, validation experts, process engineers, regulatory advisors, quality professionals, process equipment vendors, transport and logistics etc.

This manufacturing capacity would provide direct economic benefits. It is also a good starting point from which to scale up to the manufacture of a range of new medical products on a fully commercial scale for products that prove to be viable.

If the initial manufacturing for clinical trials has been undertaken in Australia, it provides Australia with a natural advantage. It can be easier and quicker to expand the manufacturing capability here, drawing on the skills and expertise developed in the clinical trial production phase, rather than start the whole process from the beginning in another country. This natural advantage does not exist where the manufacturing for the clinical trials has been undertaken overseas.

There are currently very few facilities in Australia with the capacity to produce the volumes of materials required for later stage clinical trials. In part this is because there has been a tendency in the past for Australian entrepreneurs to license promising products at an early stage of development to a foreign multinational company, which results in the further product development and manufacturing occurring overseas.

With an increasing trend towards developing products locally to a later stage, there is a need for greater local manufacturing capability. Australian medical product start-ups are typically still 'pre revenue' at this stage of their development and are not in a position to invest the capital needed to establish a new manufacturing facility. We need alternative solutions.

Readier access to manufacturing facilities to produce medical products for clinical trials could be key to keeping the further development of new medical products in Australia; and it could provide a base for establishing the full-scale manufacturing capability for medical products in Australia when the product is in the market and generating revenue.

The provision of manufacturing facilities for clinical trials would contribute to the development of new home-grown medical product companies undertaking full scale manufacturing in Australia.

The need for this type of manufacturing facility has been identified as a priority in the 2021 NCRIS Roadmap, and there is scope to use funding through the next NCRIS Investment Plan to deliver this.¹⁴ There is also scope for the National Reconstruction Fund to play a role.

Research Australia submits the Commonwealth Government should further support the development of domestic manufacturing capability of medical products for clinical trials, including through the NCRIS Investment Plan and the National Reconstruction Fund. This includes funding a feasibility study into establishing one or more manufacturing facilities for clinical trial materials to capitalise on Australia's global competitive advantage in clinical trials. It should investigate the provision of facilities in partnership with the health and medical research and innovation sector and funding models involving consortia of government and private investors.

Financial and non-financial investment opportunities or possible reforms to support the growth of advanced manufacturing in Australia in: renewables and low emission technology; medical science; transport; value adding in agriculture, forestry and fisheries; value adding in resources; defence; and enabling capabilities

Using Government procurement to promote innovation

Research Australia has welcomed the Government's recognition of the importance of its role as a purchaser of products and services and the capacity for better government procurement policy to support Australian businesses. What is perhaps not so well recognised is the scope for this policy to support innovation and the development of new medical products.

In 2016, Innovation and Science Australia undertook a review of the performance of Australia's innovation performance. One of the ways it identified the Australia Government could better support Australian innovation was through its procurement processes.

'Relative to other countries, government procurement could do more to foster innovation.

The majority of OECD countries use procurement approaches 'not only to foster value for money but also to pursue other policy objectives'. Australia ranks 63rd out of 138 countries for the extent to which government purchasing decisions foster innovation.

Australia's relatively poor performance on this measure may be related to the emphasis government procurement guidelines place on value for money. This could discourage domestic innovation and investment in innovation.

¹⁴ Australian Government, 2022, 2021 National Collaborative Research Infrastructure Roadmap, page 56

Conversely, overseas examples highlight the potential for governments to use procurement as a direct mechanism to increase the incentives for innovation. For example, the government-wide US Small Business Innovation Research (SBIR) programme was established in 1982 to encourage small businesses to participate in US Government R&D and potentially commercialise their outputs. The programme requires government departments spending more than \$100 million on extramural R&D to set aside a portion of this spend for small businesses. Similarly, the UK Small Business Research Initiative was established in 2001 to improve the number of small R&D-based businesses winning contracts from government.¹⁵

Medical products provide an ideal opportunity for the Australian Government to use its role as customer to support Australian R&D and advanced manufacturing. This is because the Australian Government is a major purchaser of healthcare products and services on behalf of the Australian population, including for the National Medical Stockpile. Working cooperatively, with state and territory governments on procurement would provide even greater opportunities.

While Innovation and Science Australia cited the SBIR program as an example, the US Government's Biomedical Advanced Research and Development Authority (BARDA) and Centers for Innovation in Advanced Development and Manufacturing (CIADM) provide a closer model for how this could work in Australia for health and medical research.

BARDA

Biomedical Advanced Research and Development Authority (BARDA), part of the HHS Office of the Assistant Secretary for Preparedness and Response, was established to aid in securing our nation from chemical, biological, radiological, and nuclear (CBRN) threats, as well as from pandemic influenza (PI) and emerging infectious diseases (EID). BARDA supports the transition of medical countermeasures such as vaccines, drugs, and diagnostics from research through advanced development towards consideration for approval by the FDA and inclusion into the Strategic National Stockpile. BARDA's support includes funding, technical assistance and core services, ranging from a clinical research organization network to Centers for Innovation in Advanced Development and Manufacturing, and a fill-finish manufacturing network. BARDA supports a diverse portfolio of medical countermeasures and these products have received a total of 55 FDA approvals, licensures, or clearances.

Our mission is accomplished through successful public-private partnerships with industry to share risk, improve efficiency and accelerate development all while sustaining a marketplace that guarantees continued access to countermeasures vital to our national security.¹⁶

The focus is on products the US Government needs to protect its population and BARDA provides financial and other support from later stage research through to manufacture of the product and then acts as a cornerstone purchaser. The manufacturing capability is delivered through three BARDA sponsored Centers for Innovation in Advanced Development and Manufacturing (CIADM).

 ¹⁵ Innovation and Science Australia (2016) Performance Review of the Australian Innovation, Science and Research System 2016. Commonwealth of Australia. Canberra. Page 29
¹⁶ https://www.phe.gov/about/barda/Pages/default.aspx

Centers for Innovation in Advanced Development and Manufacturing

The CIADMs were created through a public-private partnership model, bringing together the innovative ideas of small biotech firms, the training expertise of academic institutions, and the development and manufacturing experience of large pharmaceutical companies. This helps to ensure a sustainable domestic medical countermeasure infrastructure with unprecedented ability to accelerate development and manufacture medical countermeasures in time of need.¹⁷

BARDA and the CIADM have been critical components of the US Government's vaccine development response to the COVID-19 pandemic.¹⁸¹⁹²⁰

Medical products provide an opportunity for the Australian Government to use its role as customer to support Australian R&D and manufacturing, while also protecting Australia's population and ensuring supply of essential medical products, including in emergencies. The Government could support the development of products in areas where it thinks the product will be useful and it will be a potential purchaser- this includes pharmaceuticals, therapeutics and medical devices, as well as drug delivery mechanisms like Vaxxas.²¹

The Australian Government already provides some of this support on an ad hoc basis. An example is the 2020 agreement reached with CSL in which the Government supported the development of a new manufacturing facility here with a commitment to procure Australian antivenoms, q-fever vaccine and pandemic influenza preparedness.

'Global biotechnology leader CSL Limited (ASX:CSL; USOTC:CSLLY) today announced that Seqirus, a wholly owned subsidiary of CSL, plans to invest more than AUD\$800 million in the construction of a new biotech manufacturing facility in Melbourne to supply influenza vaccines to Australia and the rest of the world.

This investment decision follows the agreement with the Australian Government for the supply over 10 years of influenza pandemic protection for the Australian population, anti-venoms for Australian snakes, spiders and marine creatures and Q-Fever vaccine.' 16 November 2020²²

Better diagnosis and support for illness in rural, regional and remote Australia

Point of Care diagnostics (POCDs) enable conditions to be diagnosed in the GP clinic without the need for specialist assessment or to send samples to an external laboratory. While centralised pathology laboratories work well in our capital cities, this model can mean patients in remote communities wait days to get vital results, and the cost of transporting samples is much greater.

In addition to delaying the commencement of treatment, pathology lab testing requires follow up appointments to act on the results when received. All this can lead to additional workload for

¹⁷ https://www.medicalcountermeasures.gov/barda/core-services

¹⁸https://www.hhs.gov/about/news/2020/07/27/hhs-reserves-and-rapidly-expands-manufacturing-capacity-for-covid-19-vaccines-at-texas-center.html

¹⁹https://www.tamus.edu/update-on-production-of-covid-19-vaccine-candidates-by-texas-am-system-subcontractor/

²⁰ https://www.medicalcountermeasures.gov/newsroom/2020/emergent-plasma/

²¹ https://www.vaxxas.com/

²² https://wcsecure.weblink.com.au/pdf/CSL/02309014.pdf

practitioners, poorer treatment and greater inconvenience for patients, and extra costs to the Australian Government.

Supporting the development and production of accurate and cost-effective POCDs could provide benefits to the Australian Government, the population and our medical products industry. POCDs could be a good target area for an Australian BARDA style program.

Research Australia submits the Government should develop an Australian equivalent of the US Government's Biomedical Advanced Research and Development Authority (BARDA) and Centers for Innovation in Advanced Development and Manufacturing (CIADM), with the objective of supporting the development and domestic manufacture of new medical products needed to protect the health of the Australian population.

The opportunities to increase the number of workers employed in advanced manufacturing, including consideration of ways to increase the participation and retention of women and other historically underrepresented groups;

Workforce and Training

While funding for projects to support the development, commercialisation and manufacture of products is essential to Australia becoming a net exporter of medical products, ensuring we have the skilled workforce we need to deliver this goal will be equally critical.

With medical products there is an opportunity to develop a larger advanced manufacturing capability using research discoveries made here in Australia. Better capitalising on this opportunity requires better engagement between our researchers, largely employed in the public and academic sectors, and the private sector.

Greater clarity of career pathways is essential to help individuals visualise and direct their careers.²³ In a knowledge intensive industry like medical products, better defined pathways between academia and industry must be established, encouraged and incentivised to build new industries and foster true innovation. The private sector research and innovation workforce is a critical component of this mix, but a relatively small component in the Australian context. Increasing employment in private sector research organisations and increasing private sector R&D are critical to the long-term future of our entire research and innovation workforce and our capacity to increase advanced manufacturing.

Australia must plan now for the workforce we need to solve the research challenges of the future. This means creating capacity in a range of required disciplines and areas of expertise, and across the entire pipeline from basic research to manufacturing.

²³ See, for example https://mrc.ukri.org/skills-careers/interactive-career-framework/

Australian Research Council Industrial Training Transformation Centres

The *Industrial Transformation Training Centres* program funds partnerships between university based researchers and those in industry to provide Higher Degree by Research (HDR) and postdoctoral training for industries considered vital to Australia's future.²⁴

In the last five years, the ITTC has funded a number of programs relevant to advanced manufacturing for medical products in addition to programs to support other industry sectors:

- ARC Training Centre for Next-Gen Technologies in Biomedical Analysis (to 2027)
- ARC Training Centre for Optimal Ageing (digital and engineering solutions, to 2025)
- ARC Training Centre for Cryo-Electron Microscopy of Membrane Proteins for Drug Discovery (to 2026)
- ARC Industrial Transformation Training Centre for Joint Biomechanics (engineering solutions, to 2025)
- ARC Training Centre for Cell and Tissue Engineering Technologies, (to 2026)
- ARC Training Centre for Medical Implant Technologies (to 2026)

MTP Connect has delivered a number of programs for the Australian Government including the \$32 million Researcher Exchange and Development within Industry (REDI) initiative funded through the MRFF. Launched in 2020, the four-year REDI initiative aims to build the MTP workforce, address skills gaps and enhance the entrepreneurial ecosystem to improve Australia's Medical Technology and Pharmaceuticals workforce. It started with a comprehensive skills gap analysis and has subsequently developed and implemented a range of training and placement programs to target the identified gaps.²⁵ This has included Industry Fellowships, training in Good Manufacturing Process (GMP), the standard for manufacture of human health products, and a focus on.

MTP Connect's programs in advanced manufacturing and supply chain have been delivered in partnership with industry and academic organisations.²⁶ REDI has been very successful – however activities under the REDI program expire at the end of 2023. With regard to the Fellowships specifically, 47 Fellowships were awarded; to genuinely help 'shift the dial' these sorts of fellowships need to be offered on an ongoing basis with a vision for hundreds, if not thousands of fellows to eventually pass through the program.

mRNA technology has attracted significant attention because of its proven capability to rapidly deliver new vaccines and its potential for use in other therapeutic areas. As noted earlier the Commonwealth, Victorian, NSW and Queensland governments are all investing in mRNA technology. This includes the Victorian Government's funding to establish the Monash Centre for Advanced mRNA Medicines Manufacturing and Workforce Training. The Centre, based at Monash University, will offer 'professional development and workforce training opportunities across the mRNA manufacturing life cycle.'²⁷

²⁴ https://www.arc.gov.au/funding-research/funding-schemes/linkage-program/industrial-transformation-research-program/industrial-transformation-training-centres

²⁵ https://www.mtpconnect.org.au/programs/REDI

²⁶ https://www.mtpconnect.org.au/programs/REDI/skills-gaps/manufacturing

²⁷ https://www.monash.edu/mrna-workforce-training-centre

While the REDI program has sought to address existing (and some emerging) workforce gaps, and the Industrial Transformation Training Centres address specific needs in conjunction with industry partners, there has not been a more comprehensive and forward-looking forecast of future workforce needs to meet Australia's renewed ambitions for advanced manufacturing.

An Advanced Manufacturing Workforce Strategy would form part of the proposed National Medical Products Industry Plan.

Skills needs in advanced manufacturing

The skills needed in advanced manufacturing in the medical products sector include generic STEM skills as well as more specialist expertise in areas as diverse as automation, process engineering, aseptic manufacture and systems engineering. Future manufacturing will be driven by data systems (Industry 4.0) that will control the complete product lifecycle. Data will also provide a new wave of personalised medicine from vaccines to cancer treatment to preventative medicine base on DNA and lifestyle data mining and quantum computing.

Advanced manufacturing will only succeed if we have the skills to develop and commercialise products to manufacture. These include the skills associated with developing IP strategies, managing regulatory reimbursement processes and attracting investment.

This is why Research Australia proposes an Advanced Manufacturing Workforce Strategy for medical products that:

- undertakes a renewed skills gap analysis based not just on existing gaps but forecast need;
- addresses the whole pipeline of skills required from initial discovery through product development, commercialisation and manufacturing;
- builds on and expands the existing programs and consortia in place now; and
- provides a longer-term sustainable footing for workforce development and training.

Such an approach would form part of the proposed National Medical Products Industry Plan.

Conclusion

Research Australia believes Australia has the capacity to better leverage our world leading health and medical research to create a vibrant and successful industry in advanced manufacturing to become a net exporter of medical products.

Doing so would provide significant benefits for Australians with more secure access to medical products, better health outcomes and the creation of a range of skills based well-paying jobs and new businesses in a sector that has enormous scope for ongoing regional and global growth.

Health and medical research is currently funded as an untapped resource and our submission seeks to ensure that Australia makes the most of the opportunity to develop advanced manufacturing using the capability and expertise that exists within our world class health and medical research.

If you have any questions regarding this submission or require further information, please contact Greg Mullins, Head of Policy, at greg.mullins@researchaustralia.org

ABOUT RESEARCH AUSTRALIA

Our vision: Research Australia envisions a world where Australia unlocks the full potential of its world-leading health and medical research sector to deliver the best possible healthcare and global leadership in health innovation.

Our mission: To use our unique convening power to position health and medical research as a significant driver of a healthy population and contributor to a healthy economy.

Our role:

Engage	Connect	Influence
Australia in a conversation	researchers, funders	government policies that
about the health benefits	and consumers to	support effective health
and economic value of its	increase investment	and medical research
investment in health and	in health and medical	and its routine translation
medical research.	research from all sources.	into evidence-based
		practices and better
		health outcomes.

Established with the assistance of the Federal Government in 2002, Research Australia is the national alliance representing the entire health and medical research (HMR) pipeline, from the laboratory to the patient and the marketplace. Research Australia works to position Australian HMR as a significant driver of a healthy population and a healthy economy.

Nadia Levin

CEO & Managing Director

02 9295 8547

nadia.levin@researchaustralia.org

www.researchaustralia.org

384 Victoria Street Darlinghurst NSW 2010

This document and the ideas and concepts set out in this document are subject to copyright. No part of this document, ideas or concepts are to be reproduced or used either in identical or modified form, without the express written consent of Research Australia Limited ABN 28 095 324 379.